pinfa

Phosphorus, Inorganic & Nitrogen Flame Retardants Association

pinfa Advisory Board

Eleventh Meeting

Monday 25th October 2021
09:30 – 12:00 CET

Virtual

www.pinfa.eu

Participants

External representatives

Krzysztof Biskup, *Chair, European Fire Safety Alliance*

Sander Kroon, *Director of Advocacy Europe, ICL-IP*

Jacob de Boer, *Professor, VU University Amsterdam*

Izabella Vermesi, *Fire Engineer, Bureau Veritas*

Monika Sabaranska, *EMEA Materials Program Manager and ECE&I Sustainability Lead, HP*

Sicco Brandsma, *Assistant Professor, Vrije Universiteit Amsterdam*

Perrine Ethuin, *Executive Chair, Modern Building Alliance*

Frank Kuebart, *Managing Director, eco-INSTITUT*

Pim Leonards, *Professor, Vrije Universiteit Amsterdam*

Lisa Emily Melymuk, *Masaryk University*

Franklyn Okwara, *Fire Safety Expert, Modern Building Alliance*

Laurent Tribut, *Technical Expert, Schneider Electric*

pinfa representatives

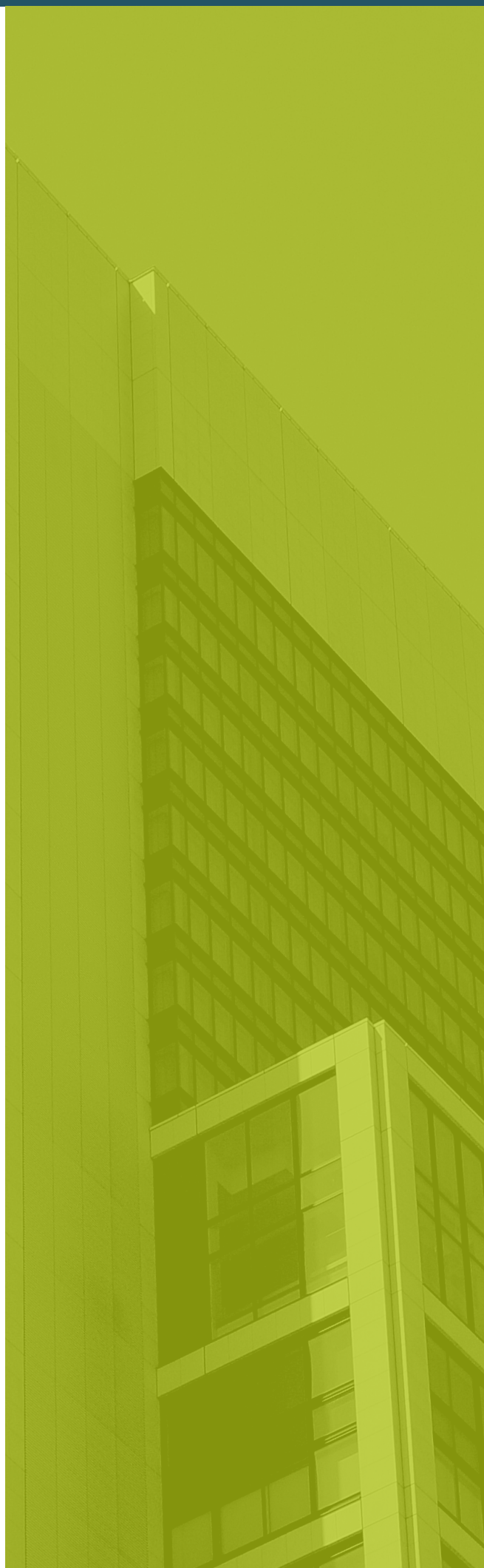
Esther Agyeman-Budu, *Sector Group Manager*

Adrian Beard, *Chairman*

External moderators

Simon Levitt, *Moderator, Harwood Levitt Consulting*

Veronica Corsi, *Moderator, Harwood Levitt Consulting*



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The pinfa Advisory Board meetings

Purpose of the pinfa Advisory Board meetings

A Sector Group within Cefic, the European Chemical Industry Council, pinfa is the Phosphorus, Inorganic and Nitrogen Flame Retardants Association. Pinfa represents the manufacturers and users of non-halogenated phosphorus, inorganic and nitrogen flame retardants (PIN FRs). As such, the Association spearheads its members' shared vision of continuously working to improve the environmental, health, and safety profiles of FR products.

To this end, pinfa constantly seeks to dialogue with industry and non-industry stakeholders in the flame retardant and the fire safety spheres, as well as the environmental sphere. The meetings of the Advisory Board provide a venue for the Association to engage with leading experts in these fields, share its ideas and activities, and tap into their inputs to inform its priorities and projects.

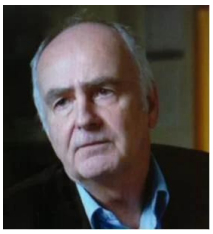
The meetings of the Advisory Board take place twice a year. The meetings do not have fixed participation, and attendees are encouraged to extend the invitation to relevant stakeholders. This report does not capture the contents of the previous meetings. The latter are recorded in a separate document, available here.

The 11th pinfa Advisory Board meeting

The 11th meeting of the Advisory Board was held virtually on 25th October 2021.

In the first section of the meeting, Prof. Jacob de Boer, Professor in Environmental Chemistry and Toxicology at Vrije Universiteit Amsterdam, drove a discussion on the EU Chemicals Strategy for Sustainability (CSS) and its implications for the FR industry, both in terms of regulation and innovation.

In the second section, Krzysztof Biskup, Chair of the European Fire Safety Alliance (EFSA), provided an update on the European Fire Safety Action Plan, designed to improve home fire safety in Europe, and the role of the European Fire Safety Week in driving forward its implementation.



Prof. Dr. Jacob de Boer
Vrije Universiteit Amsterdam

Full Professor, *Faculty of Science, Environment and Health*

Full Professor, *AIMMS*

Krzysztof Biskup
European Fire Safety Alliance

Chair, EFSA

Former Deputy Director Scientific & Research Centre for Fire Protection

Competition, compliance and confidentiality

The meetings of the Advisory Board are held in strict compliance with EU and international antitrust laws, as well as Cefic dos and don'ts.

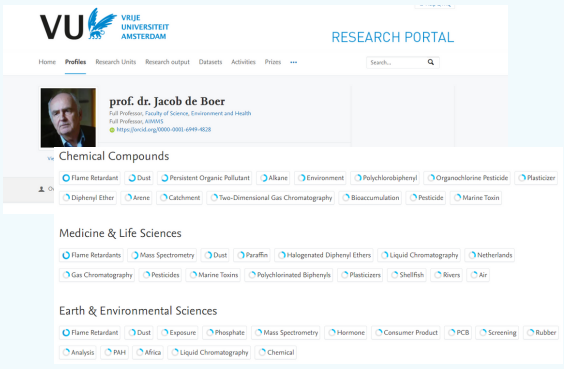
The meetings of the Advisory Board follow the Chatham House Rule, whereby attendance and the contents of the discussions are reported, but the affiliation of each individual speaker is not revealed.

In conversation with Prof. Jacob de Boer

As the European Union enters a new era for chemicals policy, the FR industry is expected to undergo key changes. We invited Prof. Dr. Jacob de Boer to share his views on the present and future of FRs, and the key challenges and opportunities that the FR industry faces.

Jacob de Boer is Professor in Environmental Chemistry and Toxicology at Vrije Universiteit Amsterdam. Prof. de Boer is a member of the CEFIC-LRI Advisory Panel (ESAP), the Board of the International Symposium on Frame Retardants (BFR), the Reference Material Review Panel of the EU Joint Research Centre in Geel (Belgium) and the QUASIMEME Scientific Advisory Board. An advisor for UN Environment and other international organisations, he has coordinated various European and international research projects.

Prof. de Boer has published over 230 peer reviewed articles, 20 book chapters and two books. He is Editor-in-chief of Chemosphere and member of the Editorial Board of the Handbook of Environmental Chemistry. He is also a regular contributor to radio and television documentaries and news programs on chemical substances, and is regularly invited to speak at international symposia.



Find out more about the research topics in which Prof. Dr. Jacob de Boer is active here

Prof. De Boer has worked for more than 45 years on the contamination of the environment with persistent organic pollutants such as polychlorinated biphenyls (PCBs), brominated and organophosphorus flame retardants, chlorinated paraffins and many other contaminants. He is currently also working on perfluorinated compounds (PFAS).

The questions were posed by different participants of the Advisory Board. Unless specified otherwise, the answers were given by Prof. de Boer.

Forty years into your career, what are in your view the greatest achievements in the field of environmental analytics and toxicology?

We have made enormous steps forward in analytical chemistry, and we should be grateful to the wonderful engineers at Agilent, Bruker, and elsewhere, for making better instruments.

Back in the day, we could barely detect DDT [dichlorodiphenyltrichloroethane] when the quantity was 0.1mg per kg. Now, we can detect femtograms at a glance.

Another major improvement has been the idea that we should limit the introduction of very persistent compounds, such as OCPs [organo-chlorine pesticides] and PCBs [poly-chlorinated biphenyls]. PCBs, for example, can still be traced in mothers' milk 35 years after a ban on their use was introduced. The fact that we were able to ban PCBSs in particular, and DDT-related compounds as well, has been a big achievement.

In conversation with Prof. Jacob de Boer

Now that we can detect these minute quantities and draw the right conclusions, we are faced with a different challenge. Detecting something does not mean that there is a risk. Is toxicology lagging behind chemistry?

We should see that as another achievement. PCBs are a clear example, and we have found other compounds with similar behaviour. Indeed, throughout the years, we have been able to detect these compounds at a lower level. I have always seen that as creating an early warning system. When we detect quantities in the order of picograms or nanograms, it does not immediately mean that there is an effect on people or animals, but it may be an early warning.

In hindsight, when we started detecting DDTs and PCBs, we found levels at which the compounds were already having a negative effect. Nowadays, things are very different because we can already detect the compounds at lower quantities, and we can issue a warning before the quantities increase further.

In the last few decades, analytical techniques have certainly improved. Even when there is a hazard connected to a certain chemical, you still need to determine whether there is also a risk. But a lot of NGOs jump on this idea that if there is a hazard, the chemical should be banned, even when it is still safe.

There is always a balance to be struck between risk and benefits. When the levels are very low, we should be mindful that these levels might go up. After much effort, we were able to ban three categories of brominated FRs, like we did with PCBs. There are others around that may be used at lower levels. An additional challenge is understanding how these compounds interact. Using different brominated FRs, for instance, produces cumulative effects.

Finally, it seems that sometimes we forget that while the environment has a self-purifying capacity, there are limits to this self-purifying capacity, and these are very low for halogenated compounds. This issue is not exclusive to FRs. If we start to see that everyone has such compounds in their blood, at levels close to safety limits, then what have we learned from DDTs?

With these PCBs, legacy brominated flame retardants or chlorinated paraffins, we always seem to be lagging behind. We find them in the environment, we study them more and more, and inally we come to the conclusion that we need to take action. Is there something we could do to get ahead of the problem?

We need more testing before starting to produce at high volumes. As we have learned from PCBs, if we bring these compounds into the world in high quantities, we will have a problem. Of course, PCBs are not the same as chlorinated paraffins, but there are many compounds which contain a number of halogens, and they cause problems. Therefore, if we could do more testing prior to production, we would be ahead in battling with this and ensuring that these compounds are safe.

I also think that it is good to keep having discussions between the FR industry, downstream users, scientists and academics like we are doing here. It is good to understand from each other what our needs are and how we can ensure that we use these compounds and chemicals, but also stay on the safe side for the environment.

Coming back to what you said about testing – the higher the tonnage, the more studies it requires. To me, the problem lies in the fact that this process is very slow and it often takes years before action is taken. The principle is correct but the practice needs to be improved.

In conversation with Prof. Jacob de Boer

The speed of the processes is an issue, of course. Europe is trying to speed things up in order to keep up with the speed at which the new chemicals are introduced. It happens every time. I'm talking about halogenic chemicals in particular, which are persistent, new to us and already around high levels. We should find solutions. As scientists, we have to be better testers.

The CSS marks a trend in terms of focusing on hazards. That is, there is no risk-based assessment of the chemical. In your view, is this approach a good way forward?

I am convinced that as soon as a molecule contains a lot of halogens, using it will create problems sooner or later. I have seen what we call 'regrettable substitution' many times. Take brominated FRs - we banned 3 but there are 72 others left. We also see it with PFAS. We are on the brink of banning a whole group like PFAS. But we are already seeing that there are PFAS with chlorine atoms in the chain, and so when PFAS will be banned as a group, we will need to consider another group. It is a never-ending battle, and it is disappointing because we know that PFAS with fluoride and chlorine will create problems due to their persistence.

Regarding risk or hazard assessment, do you think that the scoring provided by GreenScreen is a good assessment of substances, especially FRs? GreenScreen ranks hazard properties, environmental toxicology properties and toxicity properties of chemicals under different categories, looking purely at the hazard profile of the chemical. With the result, you get what is called a benchmark, with benchmark 1 being the worst and 4 the best. If this is not a good enough assessment, what could be improved? What are other assessment methodologies providing alternative toxicity rankings?

I'm not particularly familiar with GreenScreen - it's one method but there are others. With the CSS, Europe has chosen or tried to go more into hazards assessment. Of course, there are disadvantages, but in my view, it is obvious that we should go in that direction. Of course, if a molecule contains only one or two chlorine atoms, there is a grey area where we can perhaps accept a bit more [of the chemical's use]. But the whole thing still should be focused on clean processes of production, and also safe and clean products. These are two things that should be the core of our thinking, whatever the methods.

Whilst the focus has been a lot on the hazards side, I think we should focus quite a bit more on the persistence side. If a chemical compound is not very persistent, then we avoid the accumulation issue. How much focus has there been from the industry on the persistence side?

(Participant) Persistence is a very important aspect. You need persistence to have stability in your product. For example, if you have a very biodegradable substance, it will not work for 20 years.

In your view, is it impossible to make FRs that are not persistent?

(Participant) Yes, and it is not only about the product lifetime. It is also about the processing. When you process a FR into a polymer, this process usually occurs at high temperatures, which limits the use of bio-based FRs, as well as bio-based materials that also have a FR effect if they contain high amounts of nitrogen or phosphorus. The challenge is persistence in the environment versus stability of a product or ensuring that the FR effect lasts over the product's lifetime. Chemically, my imagination does not have any ideas how that challenge could be addressed.

In conversation with Prof. Jacob de Boer

(Participant) I think the solution lies at the end-of-life of the product life cycle. We should prevent this type of material from ending up in the environment. The only solution I can think of is recycling.

(Participant) Another solution is to ensure that the materials are not leaching out. We are looking at polymers that do not leach, that is the direction everyone is already on. But this still needs to be accompanied by a good end-of-life solution or recycling.

Do you think the time between realising a risk and changing the policy has been reduced compared to 30 years ago? We are all driven by interests, from the industry to politicians to consumers. That is natural, so we should not blame people for being driven by interest. The only point is how well and how fast can we work together to bring all the information to the table and decide on something that is hopefully good for the future? Are we on a good way in terms of reducing this time, or is it still the same compared to 30 years ago?

There has been quite a debate on which methods should be accepted for a risk to be established. I'm afraid that in the EU, it has been more or less concluded that these discussions take too long. Moving into hazards instead of risks comes after long discussions on faster methods and is perhaps determined by the industry's hesitation to accept that. When working together then, we should also be able to make quicker decisions.

Find out more about the ENFIRO project here.

You have also worked on phosphate esters. How do they compare to the halogenated compounds you have looked at?

Not only phosphate esters. As you probably remember, the ENFIRO project did a good job at showing that there are phosphorus-based FRs and metal-based FRs that are much better options from an environmental and human health point of view. They are safer than the halogenated compounds. We proved that there are alternatives, and we just should be creative in using the alternatives if they really prove to be better and safer for the world. I was a bit disappointed that the EU did not take that up a bit further.

Looking at the groups of FRs, they contain a lot of different chemistries. Do you think such grouping is wise?

My line of thinking is to at least first determine if there is a halogen and then count the halogens to draw the line. Of course, I know that sometimes things are more complex. Take the phosphorus-based FRs, where there can sometimes be an issue with halogens, but only one or two. There is always a grey area, when it comes to compounds with relatively simple carbon chains, structures or rings with a number of halogens. I think that is how I would like to group them.

Many FRs were banned. Now, new ones are coming. In your view, is the situation becoming more complex? Should we worry about the new FRs that are coming, particularly about mixtures?

That is definitely a trend I see. I gave the example of first banning one single compound, but then seeing new groupings emerge, such as with mixed halogen PFAS. There are also mixed halogen chlorinated paraffins with bromine in the chain, although not so many yet.

In conversation with Prof. Jacob de Boer

In terms of sustainability, it has become very difficult to find a balance between what is and what is not acceptable. All these very expensive studies should be used as a guideline to determine in which cases it is possible to use halogens, and in which cases a line is being crossed. Do you have any guidance on guidelines that help us say whether a certain direction is a no-go?

Very simple answer: no halogens. The UNEP Global Chemicals Outlook II says that the volume of chemicals in the world will double in 10 years. That is immense. We have to do something to ensure that chemicals that are used in such high quantities are safe. It is a big challenge and I have no immediate solution for all applications, including exceptions etc.

(Participant) As an industry, we should step away from playing these little tricks and games. We have to stop saying, 'we have exchanged some fluorine in PFAS for chlorine, it's a different molecule'.

Absolutely. Within the industry, it would be good to show that we are taking environmental threats seriously. I'm sure that a lot of users will appreciate that.

The "self-purifying capacity of the environment" is a reference that we do not hear much within discussions at the European level. It is an important one, because the chemicals industry is also linked to citizens' needs and quality of life. Are there any researchers looking at this from a holistic standpoint, as opposed to the industry point of view?

This idea of nature's self-purifying capacity is actually one of the fundamental ones in environmental chemistry. It seems to me what has been forgotten is that this has some limits.

We should not do experiments on a global scale with certain substances. Look at DDT. Look at PFAS. We need to always think of the world as one environment.

We are taking a step-by-step approach to learning about some chemicals and groups of FRs. What is your view on the toxicity of melamine-based FRs and zinc borate? Can we consider it safer than some halogenated compounds? In the future, will we consider it detrimental?

I remember those two compounds coming out positively in our ENFIRO project some time ago, where we looked at whether non-halogenated alternatives were better. Of course, we know that there is toxicity with melamine, if we use it in the wrong way. But it is still used - it is sold in China, for instance. However, as a FR both compounds were similarly evaluated very positively.

If you were talking to someone just starting out now, what would your advice be? Where would you encourage them to invest their research?

Invest in the quality of the data. It sounds a bit boring, but I think a lot of what we are doing in regulations has to be based on solid information. If we analyse something, the results should be the same in Spain and in Honolulu. It sounds easy, but it is not, certainly not for all those new compounds. It is very important to be able to prove that the information we talk about, that we all believe in, is the truth.

Also, staying in contact is important. Platforms such as this one did not exist in the '80s or '90s. Umbrella organisations did not give scientists a seat at the table. I think it's very important that we understand each other, and understand each other's needs and challenges.

Ten actions to improve home fire safety in Europe

The European Fire Safety Alliance

> *Each year, the European Union records over 5,000 deaths from residential fires. Behind this figure are people who have died, people who have lost a loved one, and tragedies that could have been prevented.*

Bringing together fire professionals and prevention specialists from all over Europe, the European Fire Safety Alliance (EuroFSA) has made it its mission to reduce deaths caused by incidental fires that occur in the residential environment - that is, preventable fire deaths. fire safety in Europe.

EUROPEAN FIRE SAFETY ALLIANCE

Find out more about EuroFSA's work here.

The European Fire Safety Action Plan

The Action Plan is the brainchild of the first edition of the **European Fire Safety Week** (2019), and takes into account the contributions of hundreds fire safety experts and research from EuroFSA as well as other institutes.

As such, the Action Plan is the **first knowledge- and evidence-based plan for fire safety in Europe**.

The Action Plan is built on **six focus areas**, zooming in on the major home fire safety issues. Each of these six focus areas entails a set of concrete actions for improving fire safety in European homes.

1 - Increase the fire safety of the growing vulnerable community

Improve the home fire safety of the most vulnerable groups (i.e., children, elderly people, and people with mental or physical disabilities) by establishing a European approach to identifying and mitigating the risk factors that are specific to each group **(Action 1)**.

2 - Improve the reduced escape time of people during a fire

Increase the available escape time in case of a residential fire by introducing an EU-wide standard for fire-safe upholstered furniture and mattresses **(Action 2)**, broadening the application of smoke detectors in homes **(Action 3)**, and evaluating and improving the functioning of Low Ignition Propensity (LIP) cigarettes **(Action 4)**.

Ten actions to improve home fire safety in Europe

3 - Make fire safety an inseparable part of the energy transition

Integrate fire safety into the energy transition by building the knowledge and competencies required to address and monitor the fire risks associated with the new forms of energy **(Action 5)**, and make the investments needed to ensure the fire safety of the new forms of energy, the new forms of transportation, and circular construction.

> *Electrical fires already account for 20-30% of all fires in homes. As electricity usage increases, so will electrical hazards. We need to make the energy transition safe.*

4 - Improve the reduced escape time of people during a fire

Raise awareness of fire safety to increase attention to fire safety, by supporting the Community Fire Safety projects run by the Fire Rescue Services **(Action 6)**, and investing in scientific research on how to positively influence people's fire safety behaviour **(Action 7)**.

5 - Build EU-wide data on residential fires

Improve fire prevention by collecting residential fire data that is reliable and comparable across the EU **(Action 8)**, as a follow-up on the EU FireStat project, and integrating the collected data into Eurostat.

6 - Improve EU-wide communication and collaboration

Strengthen EU-wide communication and collaboration by providing greater room for other actors within the Fire Information Exchange Platform (FIEP), such as the Fire Rescue Service, and focussing the FIEP on the exchange of knowledge and information on fire safety for the most vulnerable groups **(Action 9)**, and improving co-operation between the EU Member States and industry on market surveillance **(Action 10)**.

Ten actions to improve home fire safety in Europe

The European Fire Safety Week

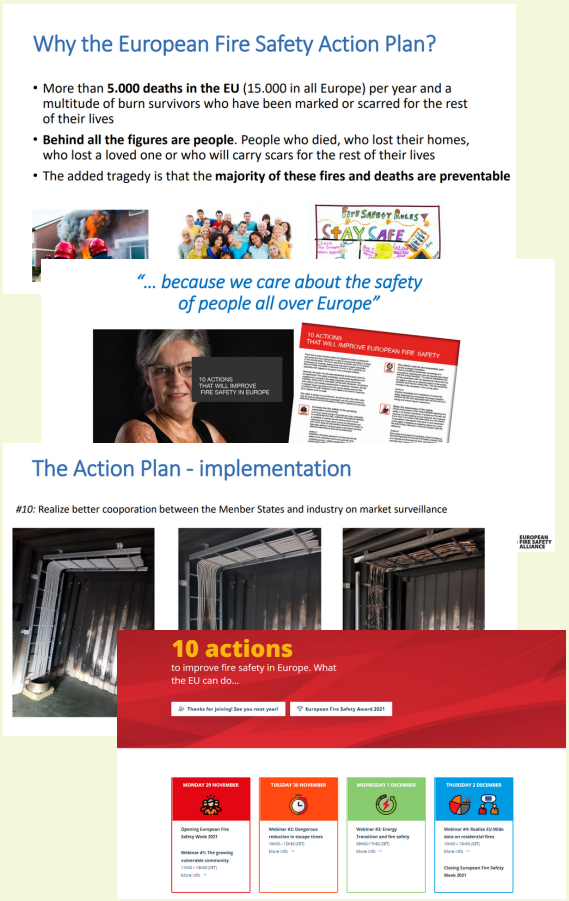
The European Fire Safety Action Plan and its implementation are the focus of the third edition of the **European Fire Safety Week (29th November - 2nd December 2021)**.

Day 1 (Monday 29th November) focuses on the growing vulnerable community.

The webinar brings together a wealth of fire safety professionals and researchers to address questions such as, what are the main fire safety issues for vulnerable groups? How does the vulnerable community relate to fire safety issues? What are the right measures to improve the fire safety of the most vulnerable people in Europe?

Day 2 (Tuesday 30th November) focuses on the dangerous reduction in escape times.

The webinar elaborates on the results of the studies on smoke propagation conducted by the Dutch Fire Academy (The Netherlands, 2019), and consider how the EU Member States can act to reduce fire deaths in the home, e.g. by broadening the application of smoke detectors, upholstered furniture, mattresses and cables.



Find out more about European Fire Safety Week here.

Day 3 (Wednesday 1st December) focuses on the role of fire safety within the energy transition.

The webinar considers electrical safety in the context of the energy transition, fire safety competency to support the renovation wave, and new fire challenges of green energy in buildings. The ensuing political discussion will be chaired by former MEP Theresa Griffin and involve discussion on the upcoming revision of the Energy Performance of Buildings Directive.

Day 4 (Thursday 2nd December) focuses on the outcomes of the EU fire stats project, and consider the concrete next steps to improve collection of fire safety data on residential fires.

The focus of the webinar is on how best we can help implement the results of the EUFireStat project after its completion in 2022, using best practice examples on the use of data. The subject fits in the action points of Focus Area 5 of the European Fire Safety Action Plan.

Ten actions to improve home fire safety in Europe

Discussion

> *By working together, we will achieve the diversity of perspectives and synergy of efforts needed to solve such complex challenges."*

Partnering to move the needle

Upholstered furniture has been identified as a problem before, and the idea of creating a standard goes back to the 1990s. Historically, the lobbying of the furniture industry against stricter safety standards has been quite successful. What makes the European Fire Safety Action Plan different? For EuroFSA, an important outcome of the European Fire Safety Action Plan is the **creation of project teams**, bringing together a diverse stakeholder group to focus on the implementation of each of the above actions in the relevant issue areas.

Testing conditions determine the results

By how long does adding a flame retardant increase escape time? There is no fixed number. The way in which a fire develops differs depending on the particular scenario, based on the position and the size of the ignition source.

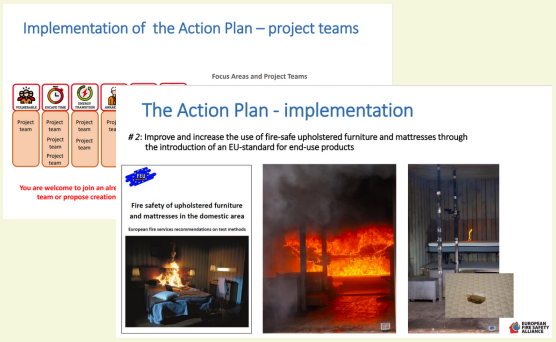
Whilst numbers give the impression that there is an average to work around, it really depends on the scenario. The key thing is that flame retardants prevent fire from a small ignition source. In case of a big ignition source, any sofa or other item will burn.

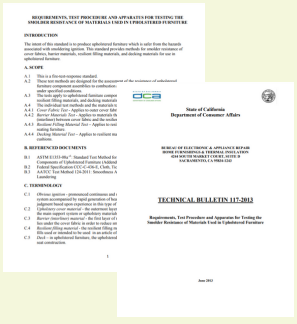
Reconciling fire risks and chemical risks

California has recently changed the safety standards for upholstered furniture, which only has to resist a smouldering cigarette. Flame retardants are no longer required. In order to get rid of "bad" flame retardants in California by focussing on the flammability standard, rather than the restriction of chemicals. This approach, however, risks missing a number of important issues:

Where do we have a fire risk? Where is it necessary to increase fire safety? What are the best solutions to achieve fire safety?

A better approach would be to make chemical legislation more flexible and agile, to adjust quickly to changing new information.





Find out more about California's upholstered furniture flammability standard here.

Conclusion and next steps

The participants of the Advisory Board meeting were again positive about the initiative. The fact that there were participants from the scientific community was especially welcomed, as the range of backgrounds in the room provided the conditions for sharing expertise and learnings across fire safety and environmental topics.

There was a recognition that the structure adopted within the meetings of the Advisory Board, which provides a venue for these worlds to come together and dialogue, is an effective way of sharing knowledge and will yield positive outcomes.

For 2022, pinfa plans to hold in-person meetings for this group again, possibly with a dial-in option for remote participants.

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Once agreed by the participants of the Advisory Board, this document can be used by any member of the group for discussions with others, to show the areas of exchange and to encourage collaboration on the topics involved

pinfa

Phosphorus, Inorganic & Nitrogen Flame Retardants Association

A sector group of Cefic

European Chemical Industry Council - Cefic aisbl

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